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(54) **Modular frame for a press section**

Modularer Rahmen für eine Pressenpartie

Cadre modulaire pour section de presse

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Description

[0001] The invention relates to a frame for a press section.

[0002] At present, the frame layout for press sections is designed individually for almost each machine so that it is normally not possible to reuse an earlier made frame or frame layout for the construction or design of other press sections. The only exceptions in this connection are machines which are completely reused or copied. So called "sister machines" are, however, only built in very small quantities.

[0003] The disadvantages arising from such individual frame designs are e.g. the longer times which are required for offering, calculation, design/engineering and manufacturing resulting in higher production costs for the individual machines.

[0004] Frames for individually designed press sections of paper machines are widely known in the prior art.

[0005] For instance, document WO-A- 2006/106178 discloses a press section of a paper machine having a frame which is constructed of beams. More precisely, the frame is constructed of load-bearing beams and support beams which extend between the load-bearing beams from a tending side to a driving side. In the load-bearing beams, there are provided fabric feed devices.

[0006] Document WO-A- 99/55956 discloses a further press section in a paper machine which is specially constructed in order to facilitate the replacement of the press fabrics. The press section has two separate press nips. For each press nip, there is provided a frame part which comprises rectangular side frames on both sides. The side frames of frame parts of different press nips are connected to each other by an upper horizontal beam which is placed above the side frames. The upper horizontal beam operates as a machine-direction cantilever beam so that it is possible to open the side frame of one of the press nips while the upper horizontal beam supports this frame.

[0007] Document DE 10 2004 046 060 A1 discloses another construction of a frame for press section comprising multiple nips which comprise inclined pairs of nip rolls. The frame comprises one side frame on a driving side and one side frame on the tending side which frames are connected to each other with cross beams and cantilever beams. The side frames are constructed integrally or are constructed of multiple parts which are so connected as if the side frames were integrally formed parts.

[0008] WO-A-99/55956 discloses a frame having the features according to the preamble of claim 1.

[0009] It is the object of the invention to provide a frame for a web forming machine having a simplified construction. This object is achieved by a frame for a web forming machine having the features of claim 1. Advantageous further formations are subject of the dependent claims.

[0010] According to the invention, the frame for a web forming machine comprises frame side elements, at least one intermediate cross machine direction beam and at least one upper cross machine direction beam. Preferably, there are provided at least two intermediate cross machine direction beams. The frame side elements extend in machine direction and comprise a rectangular nip frame module adapted to support an inclined pair of nip rolls and an upper connection beam which is located above the nip frame module and which is connected to the nip frame module. The intermediate cross machine direction beams connect the nip frame modules. The upper cross machine direction beam connects the upper connection beams. Furthermore, insertion units are provided in the rectangular nip frame modules. By constructing the frame in the above manner, it becomes possible to produce standardized frames for different web forming machines.

[0011] It is noted that the frame according to the invention is not a cantilevered frame in cross machine direction. This arrangement saves a lot of space for rolls and felts between the side frames.

[0012] Preferably, the frame side elements are constructed with straight beams having a constant profile. Using beams with constant profile has the advantage that the construction is simplified.

[0013] It is advantageous if the frame is constructed of U-shaped frame parts or if the frame consists of two U-shaped frame parts which are arranged opposite to each other.

[0014] It is even more preferable that the beams of the frame side elements are arranged vertically and horizontally to form the rectangular nip frame module. With such an arrangement of the beams, a further simplification is achieved.

[0015] It is beneficial if the frame further comprises a support arm for supporting an upper nip roll.

[0016] Preferably, the nip frame module comprises at least one guide hole for linearly guiding the support arm and the upper nip roll between a machine running position and a maintenance position.

[0017] It is particularly favorable if the support arm of the upper nip roll has at least a two point support in the machine running position and a three point support in the maintenance position. Thus, the upper nip roll can be securely held in the maintenance position.

[0018] Preferentially, the frame further comprises a lower connection beam adapted to connect adjacent frame side elements to each other. By use of such an additional frame, it is possible to reliably fix adjacent nip frame modules to each other.

[0019] It is advantageous if the lower connection beam extends in machine direction and is fixed on the frame side elements at a position corresponding to nip level or upper nip roll.

[0020] As an advantageous formation, a press section of a paper machine comprises a frame as described above and an inclined pair of nip rolls defining a press nip.

[0021] It is favorable that, in the press section, the lower nip roll is supported on a base beam which extends in a machine direction from both sides.

[0022] Preferably, the press section comprises at least two inclined pairs of nip rolls, a corresponding number of nip frame modules on each side of the nip rolls and at least one transfer suction box which is installed between adjacent nip frame modules. However, the transfer suction box not necessarily has to be installed between adjacent nip frame modules.

[0023] It is beneficial if the press section further comprises guide rolls between the frame side elements and if the guide rolls are sill rolls.

[0024] Other features and advantages of the present invention will become apparent from the following description which is made with reference to the drawings.

[0025] Fig. 1 shows a side view of a press section of a web forming machine comprising a frame according to an embodiment of the present invention.

[0026] Fig. 2 is another side view showing a modification of the frame of the press section shown in fig. 1.

[0027] Below, an embodiment of the present invention will be described with reference to the drawings.

[0028] The press section shown in Fig. 1 comprises two serially arranged press portions each having an inclined pair of nip rolls 11 and 12 which are supported by frames 1 according to the invention, respectively.

[0029] Each of these frames 1 is mainly composed of two frame side elements 2 which are provided on the driving side and the tending side of the press section, respectively. The frame side elements 2 extend in machine direction and are connected to each other by means of intermediate cross machine direction beams 3a and upper cross machine direction beams 3b. The intermediate cross machine direction beams 3a and the upper cross machine direction beams 3b only connect the frame side elements so that the beams are no cantilever beams. In other words, the beams are supported on the frame side elements such that they only extend between the frame side elements and bear forces in the longitudinal directions of the beams. Furthermore, according to the embodiment, there is also provided a lower cross machine direction beam 14 which is provided under the intermediate cross machine direction beams 3a and the upper cross machine direction beams 3b between the frame side elements 2 at a lower portion of the frame side elements 2. The lower cross machine direction beam 14 is stronger than the intermediate cross machine direction beam and the upper cross machine direction beam because it serves for changing the lower nip roll and also for frame support. More precisely, there is a rail provided on the lower cross machine direction beam which simplifies moving the lower nip roll 11.

[0030] The frame side elements 2 are constructed of nip frame modules 21 and upper connection beams 22 which are located above the nip frame modules 21. The nip frame modules 21 are rectangular and are made up of straight beams having a constant profile.

[0031] In detail, the nip frame modules in Fig. 1 are constructed with vertically and horizontally arranged straight beams which are connected to each other in a suitable manner. For the interconnection between the individual beams, conventional joining techniques such as welding, screwing etc. can be used. When joining the beams, it is only important to use a joining technique which is suitable for bearing the loads which exist in press sections. In order to provide a secure and durable connection between the beams, it is possible to reinforce the connections with additional parts which are fitted on the connection portion. In Fig. 1, such reinforcement is realized by means of triangular supports 15 which are fixed in the corners between two adjacent beams.

[0032] As mentioned above, the straight beams which are used for the nip frame modules 2 in this embodiment have a constant profile. For such profile, different forms can be used including e.g. a U-shape, T-shape, double-T-shape or the like. In other words, any profile form which is suitable for providing sufficient (buckling, bending) strength can be used.

[0033] Furthermore, the rectangular nip frame module 21 according to the embodiment comprises a machine direction base beam which is provided at the lower portion of the rectangular nip frame module 21. This machine direction base beam is constructed to be stronger than the other beams of the nip frame module because the machine direction base beam has to bear more load than the beams located above it. With such a construction, the machine direction base beam can reliably support the other elements of the frame.

[0034] In the frame side elements, or more precisely in the nip frame module 21 according to the embodiment, insertion units 4 are provided for enabling a change of a conveying means which carries the web through the press nip. Such conveying means can be a felt, a fabric or a belt made of any other suitable material like e.g. a woven material, a polymer material or a metal material. Preferably, the beams of the frame define two U-shaped frame parts which are most suitable for integrating insertion units between them. In detail, the nip frame module 21 of each frame side element 2 can be built up with an upper U-shaped frame part defined by three beams and a lower U-shaped frame part which is also defined by three beams. These U-shaped frame parts are so arranged that the open sides of the U-shaped face each other and that the ends of the beams on the open side are connected to each other with the insertion units arranged between them. For big machines, insertion units are the most preferable way for enabling an easy change of the conveying means because the upper parts of the frame do not have to be supported by any further means.

[0035] The press section shown in Fig. 1 further comprises a support arm 23 for supporting the upper nip roll 12. This support arm 23 is provided for securely supporting the upper nip roll 12 during a change of the conveying means. For that purpose the support arm 23 is attached to the nip frame module 21 in such a manner that it is movable from a machine running position to a maintenance position. In Fig. 1, the support arm 23 is linearly guided by a guide hole (an elongated hole or slit). How-

ever, the support arm 23 can be guided in any other manner as long as the upper nip roll 12 can be moved in the maintenance position which is suitable for changing the conveying means. In the maintenance position, the support arm 23 is preferably supported at three points. In contrast thereto, when the support arm 23 is in the machine running position, it is sufficient if the support arm 23 is supported at two points.

[0036] Between adjacent nip frame modules 21, at least one transfer suction box Z can be provided in order to guide the web from one press nip to another. However, a suction roll can be used instead of a transfer suction box although the use of a transfer suction box provides advantages with respect to the installability. More precisely, the use of a suction roll may enlarge the whole construction because it needs more installation space than transfer suction boxes.

[0037] Furthermore, some of the rolls X used in the press section are sill rolls X which are supported on a sill or shelf on an inner side of the frame side elements. With such a construction, the rolls are supported between the frame side elements.

[0038] Fig. 2 describes another construction of a press section having the frame according to the invention. Similar parts as those shown in Fig. 1 are designated with the same reference signs.

[0039] The construction shown in Fig. 2 differs from that of Fig. 1 in that a lower connection beam 16 is provided which connects adjacent frame side elements 2 or nip frame modules 21. Such an arrangement further provides stability to the frame structure. Also, the support arm 23 which is linearly guided in Fig. 1 is supported by a pivot mechanism which is able to shift the upper nip roll 12 into the maintenance position.

[0040] Moreover, the triangular supports 15 in Fig. 1 which are used for reinforcing the connecting portion between adjacent beams are integrally formed with the beams. This provides additional stability in the frame structure.

[0041] The described frame layout is not limited to the use in a press section having two serially arranged press nips. Rather, the frame layout can be used for multiple press nips or only one single press nip by use of a corresponding number of nip frame modules. It is preferable if in case of multiple nips and, consequently, multiple nip frame modules, frame side elements are used having the same dimension. However, it is also possible to use nip frame modules having different dimensions. Also, the above described frame construction can be suitably used in other sections of a web forming machine.

[0042] The invention is not limited to the above embodiments but is defined by the features as set out in the appended claims.

[0043] It is noted that the term web forming machine is meant to include particularly paper machines and (card) board machines.

Claims

1. Frame (1) for a web forming machine, comprising
frame side elements (2) extending in machine direction
wherein the frame side elements (2) each comprise a rectangular nip frame module (21) adapted to support an inclined pair of nip rolls (11, 12) and an upper connection beam (22) located above the nip frame modules (21) and connected to the nip frame modules (21);
at least one intermediate cross machine direction beam (3a) connecting the nip frame modules (21);
at least one upper cross machine direction beam (3b) connecting the upper connection beams (22); and
insertion units (4),
characterized in that
said insertion units (4) are provided in the rectangular nip frame modules (21) and are enabling an easy change of a conveying means without supporting the upper parts of the frame by any further means.

2. Frame (1) according to claim 1, wherein the frame side elements (2) are constructed with straight beams having a constant profile.

3. Frame (1) according to claim 1 or 2, wherein the frame is constructed of U-shaped frame parts.

4. Frame (1) according to claim 2, wherein the frame consists of two U-shaped frame parts which are arranged opposite to each other.

5. Frame (1) according to one of claims 2 to 4, wherein the beams of the frame side elements (2) are arranged vertically and horizontally to form said rectangular nip frame module.

6. Frame (1) according to one of the preceding claims, further comprising a support arm (23) for supporting an upper nip roll (12).

7. Frame (1) according to claim 6, wherein the nip frame module (21) comprises at least one guide hole for linearly guiding the support arm (23) and the upper nip roll (12) between a machine running position and a maintenance position.

8. Frame (1) according to claim 7, wherein the support arm (23) has at least a two point support in the machine running position and a three point support in the maintenance position.

9. Frame (1) according to one of the preceding claims, further comprising a lower connection beam adapted to connect adjacent frame side elements (2) to each other.

10. Frame (1) according to claim 9, wherein the lower connection beam extends in machine direction and is fixed on the frame side elements (2) at a position corresponding to nip level or the upper nip roll.

11. Press section of a paper machine comprising
a frame (1) according to one of the preceding claims and
an inclined pair of nip rolls (11, 12) defining a press nip.

12. Press section according to claim 11, wherein the lower nip roll (11, 12) is supported on a machine direction base beam (13) from both sides.

13. Press section according to claim 11 or 12, comprising at least two inclined pairs of nip rolls (11, 12), a corresponding number of nip frame modules (21) on each side of the nip rolls (11, 12) and at least one transfer suction box (Z) which is installed between adjacent nip frame modules (21).

14. Press section according to claim 12, further comprising guide rolls (X) between the frame side elements (2).

15. Press section according to claim 14, wherein the guide rolls (X) are sill rolls.

Patentansprüche

1. Rahmen (1) für eine bahnerzeugende Maschine, der Folgendes aufweist
Rahmenseitenelemente (2), die sich in einer Maschinenrichtung erstrecken,
wobei die Rahmenseitenelemente (2) jeweils ein rechtwinkliges Spaltrahmenmodul (21), das angepasst ist, um ein geneigtes Paar von Spaltwalzen (11, 12) zu stützen, und einen oberen Verbindungsbalken (22) umfassen, der sich oberhalb der Spaltrahmenmodule (21) befindet und mit den Spaltrahmenmodulen (21) verbunden ist;
zumindest einen Zwischenbalken (3a) in Maschinenquerrichtung, der die Spaltrahmenmodule (21) verbindet;
zumindest einen oberen Balken (3b) in Maschinenquerrichtung, der die oberen Verbindungsbalken (22) verbindet; und
Einsetzeinheiten (4),
dadurch gekennzeichnet, dass
die Einsetzeinheiten (4) in den rechtwinkligen Spaltrahmenmodulen (21) vorgesehen sind und einen einfachen Wechsel einer Fördereinrichtung ermöglichen, ohne die oberen Teile des Rahmens durch weitere Einrichtungen zu stützen.

2. Rahmen (1) nach Anspruch 1, wobei die Rahmenseitenelemente (2) mit geraden Balken mit einem konstanten Profil konstruiert sind.

3. Rahmen (1) nach Anspruch 1 oder 2, wobei der Rahmen aus U-förmigen Rahmenteilen konstruiert ist.

4. Rahmen (1) nach Anspruch 2, wobei der Rahmen aus zwei U-förmigen Rahmenteilen besteht, die einander gegenüberliegend angeordnet sind.

5. Rahmen (1) nach einem der Ansprüche 2 bis 4, wobei die Balken der Rahmenseitenelemente (2) vertikal und horizontal angeordnet sind, um das rechtwinklige Spaltrahmenmodul auszubilden.

6. Rahmen (1) nach einem der vorangehenden Ansprüche, ferner mit einem Stützarm (23) zum Stützen einer oberen Spaltwalze (12).

7. Rahmen (1) nach Anspruch 6, wobei das Spaltrahmenmodul (21) zumindest ein Führungsloch zum linearen Führen des Stützarms (23) und der oberen Spaltwalze (12) zwischen einer Maschinenbetriebsposition und einer Wartungsposition aufweist.

8. Rahmen (1) nach Anspruch 7, wobei der Stützarm (23) zumindest eine Zweipunktabstützung in der Maschinenbetriebsposition und eine Dreipunktabstützung in der Wartungsposition aufweist.

9. Rahmen (1) nach einem der vorangehenden Ansprüche, ferner mit einem unteren Verbindungsbalken, der angepasst ist, um benachbarte Rahmenseitenelemente (2) miteinander zu verbinden.

10. Rahmen (1) nach Anspruch 9, wobei sich der untere Verbindungsbalken in einer Maschinenrichtung erstreckt und an den Rahmenseitenelementen (2) an einer Position entsprechend einem Spaltniveau oder der oberen Spaltwalze fixiert ist.

11. Pressenpartie einer Papiermaschine, die Folgendes aufweist:

einen Rahmen (1) nach einem der vorangehenden Ansprüche, und
ein geneigtes Paar von Spaltwalzen (11, 12), die einen Pressenspalt festlegen.

12. Pressenpartie nach Anspruch 11, wobei die untere Spaltwalze (11, 12) an einem Maschinenrichtungsbasisbalken (13) von beiden Seiten gestützt ist.

13. Pressenpartie nach Anspruch 11 oder 12, mit zumindest zwei geneigten Paaren von Spaltwalzen (11, 12), einer entsprechenden Anzahl von Spaltrahmenmodulen (21) auf jeder Seite der Spaltwalze (11, 12) und zumindest einen Übertragungssaugkasten (Z),

der zwischen benachbarten Spaltrahmenmodulen (21) installiert ist.

14. Pressenpartie nach Anspruch 12, ferner mit Führungswalzen (X) zwischen den Rahmenseitenelementen (2).

15. Pressenpartie nach Anspruch 14, wobei die Führungswalzen (X) konsolengestützte Walzen sind.

Revendications

1. Cadre (1) pour une machine de formation de bande, comprenant
des éléments (2) côté cadre s'étendant dans la direction de la machine où les éléments (2) côté cadre comprennent chacun un module rectangulaire (21) de cadre de pincement adapté pour supporter une paire inclinée de rouleaux pinceurs (11, 12) et une poutrelle de liaison supérieure (22) située au-dessus des modules (21) de cadre de pincement et reliée à ces derniers ;
au moins une poutrelle intermédiaire (3a) dans la direction transversale de la machine reliant les modules (21) de cadre de pincement ;
au moins une poutrelle supérieure (3b) dans la direction transversale de la machine reliant les poutrelles de liaison supérieures (22) ; et
des unités d'insertion (4),
caractérisé en ce que
lesdites unités d'insertion (4) sont pourvues dans les modules rectangulaires (21) de cadre de pincement et permettent un changement facile d'un moyen d'acheminement sans supporter les parties supérieures du cadre par tout autre moyen.

2. Cadre (1) selon la revendication 1, dans lequel les éléments (2) côté cadre sont constitués de poutrelles droites ayant un profil constant.

3. Cadre (1) selon la revendication 1 ou 2, dans lequel le cadre est constitué de parties de cadre en forme de U.

4. Cadre (1) selon la revendication 2, dans lequel le cadre est constitué de deux parties de cadre en forme de U qui sont agencées l'une en face de l'autre.

5. Cadre (1) selon l'une des revendications 2 à 4, dans lequel les poutrelles des éléments (2) côté cadre sont agencées verticalement et horizontalement pour former ledit module rectangulaire de cadre de pincement.

6. Cadre (1) selon l'une des revendications précédentes, comprenant en outre un bras de support (23) pour supporter un rouleau pinceur supérieur (12).

7. Cadre (1) selon la revendication 6, dans lequel le module (21) de cadre de pincement comprend au moins un trou de guidage pour guider linéairement le bras de support (23) et le rouleau pinceur supérieur (12) entre une position de marche de la machine et une position de maintenance.

8. Cadre (1) selon la revendication 7, dans lequel le bras de support (23) comporte au moins un support à deux points dans la position de marche de la machine et un support à trois points dans la position de maintenance.

9. Cadre (1) selon l'une des revendications précédentes, comprenant en outre une poutrelle de liaison inférieure adaptée pour relier des éléments adjacents (2) côté cadre entre eux.

10. Cadre (1) selon la revendication 9, dans lequel la poutrelle de liaison inférieure s'étend dans la direction de la machine et est fixée sur les éléments (2) côté cadre à une position correspondant à un niveau de pincement ou au rouleau pinceur supérieur.

11. Section de presse d'une machine à papier, comprenant
un cadre (1) selon l'une des revendications précédentes, et
une paire inclinée de rouleaux pinceurs (11, 12) définissant un pincement de presse.

12. Section de presse selon la revendication 11, dans laquelle le rouleau pinceur inférieur (11, 12) est supporté sur une poutrelle de base (13) dans la direction de la machine des deux côtés.

13. Section de presse selon la revendication 11 ou 12, comprenant au moins deux paires inclinées de rouleaux pinceurs (11, 12), un nombre correspondant de modules (21) de cadre de pincement sur chaque côté des rouleaux pinceurs (11, 12) et au moins une caisse aspirante de transfert (Z) qui est installée entre des modules adjacents (21) de cadre de pincement.

14. Section de presse selon la revendication 12, comprenant en outre des rouleaux-guides (X) entre les éléments (2) côté cadre.

15. Section de presse selon la revendication 14, dans laquelle les rouleaux-guides (X) sont des rouleaux d'appui.

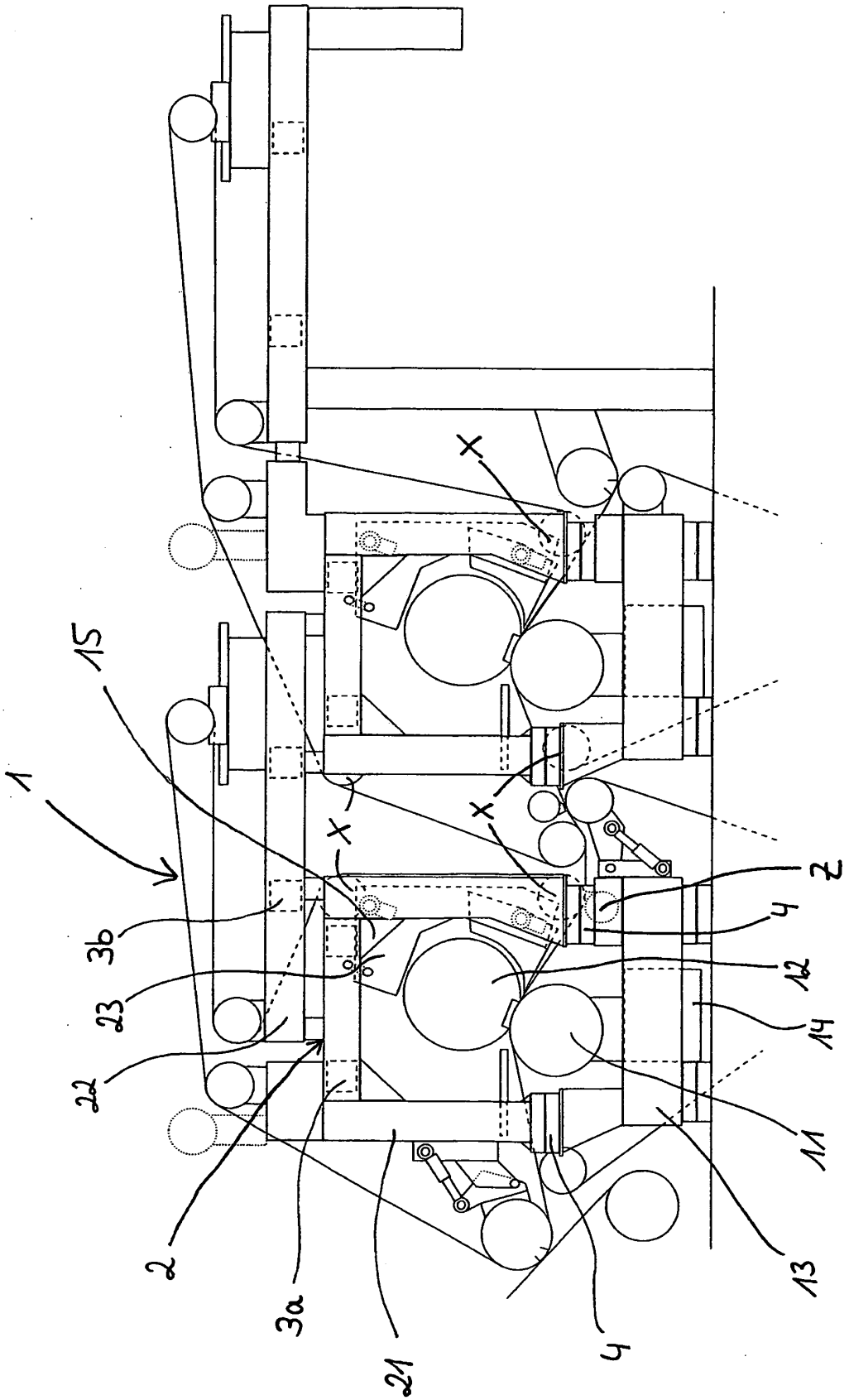


Fig. 1

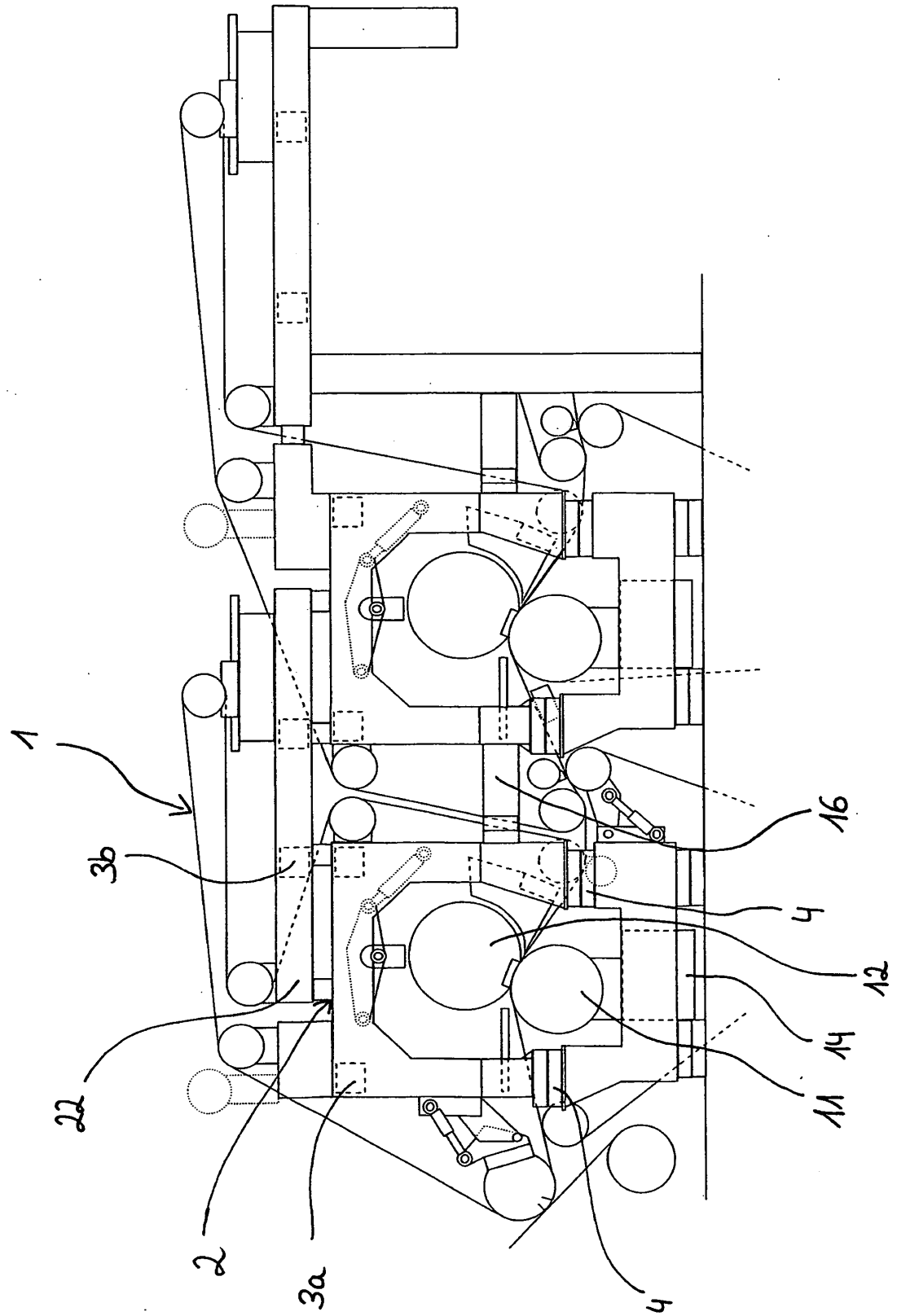


Fig. 2

REFERENCES CITED IN THE DESCRIPTION

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